Characteristics of the model PM (SRM 1648a, NIST) and its photoactivity in reactive oxygen species generation

Magdalena Mikrut, Anna Regiel-Futyra, Wojciech Macyk, Grażyna Stochel, Rudi van Eldik

[1] *Faculty of Chemistry, Jagiellonian University, ul. R. Ingardena 3, 30-060 Kraków, Poland*
E-mails: mikrut@chemia.uj.edu.pl, rudi.vaneldik@fau.de

One of the greatest problems the world is facing today is air pollution which has been considered a hazard to human health. Particulate matter (PM) is a mixture of solid and liquid nanoparticles (NP) suspended in the air [1]. Inhaled PM can react with oxygen carried by blood resulting in reactive oxygen species (ROS) generation or can function as a platform mediating and catalyzing chemical reactions [2]. These particulate properties (size, chemistry composition and trace element) play a significant role in redox biochemistry [3].

The aim of this study was to characterize the SRM 1648a (NIST) sample and investigate ROS generation by this material. Organic fraction of the material has been removed by oxygen plasma treatment. Contents of carbon and nitrogen were determined by elemental analysis. The mechanisms of photocatalytic or thermal activity of samples were investigated. Particle morphology and chemical composition were evaluated by scanning electron microscopy, SEM/EDX. Inductively coupled plasma - optical emission spectrometer was used to analyze water-soluble elements. Nanoparticles Tracking Analysis method has been used to examine size of particles. Oxidation of terephthalic acid has been used as a method of $HO^{\cdot}$ radicals detection. For $^1O_2$ determination the phosphorescence of singlet oxygen was measured. In this presentation the influence of organic and inorganic content of PM on ROS generation will be presented and discussed.

Acknowledgement: The authors would like to thank SYMPHONY project (grant No. 2015/16/W/ST5/00005) for the financial support.

References:

[1] Health effects of particulate matter. Policy implications for countries in eastern Europe, Caucasus and central Asia, World Health Organization, **2013**
[2] A. Nel, T. Xia, L. Mädler, N. Li, *Science*, **2006**, 311, 622-627
[3] R.M. Harrison, J. Yin, *Sci Total Environ.*, **2000**, 249, 85-101